



U.S. Department  
of Transportation

Pipeline and  
Hazardous Materials  
Safety Administration

400 Seventh Street, S.W.  
Washington, D.C. 20590

**AUG 31 2005**

DOT-E 14154  
(FIRST REVISION)

EXPIRATION DATE: February 28, 2007

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Carleton Technologies, Inc.  
Westminster, MD
2. PURPOSE AND LIMITATIONS:
  - a. This exemption authorizes the manufacture, mark, sale, and use of non-DOT specification fully wrapped carbon-fiber reinforced aluminum lined cylinders for the transportation in commerce of the materials authorized by this exemption. This exemption provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein.
  - b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce. The safety analyses did not consider the hazards and risks associated with consumer use, use as a component of a transport vehicle or other device, or other uses not associated with transportation in commerce.
3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.
4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 180.205, 173.302a(a)(1), 173.304a(a)(1) and 175.3 in that non-DOT specification cylinders are not authorized, except as prescribed herein.

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5. BASIS: This exemption is based on the application of Carleton Technologies, Inc. dated January 18, 2005 and additional information dated February 22, 2005 and August 10, 2005, submitted in accordance with § 107.105 and the public proceeding thereon.
6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Hazardous Material Description				
Proper Shipping Name		Hazard Class/ Division	Identification Number	Packing Group
Air, compressed (containing up to 23.5% oxygen content by volume)		2.2	UN1002	N/A
Compressed gas, oxidizing, n.o.s. (oxygen enriched air, oxygen not over 39%)		2.2	UN3156	N/A
Oxygen, compressed		2.2	UN1072	N/A

7. SAFETY CONTROL MEASURES:

- a. PACKAGING - Prescribed packaging is a fully wrapped carbon-fiber reinforced aluminum lined cylinder manufactured and marked in conformance with Basic Requirements for Fully Wrapped Carbon-Fiber Reinforced Aluminum Lined Cylinders (DOT-CFFC) (Fourth Revision), dated November 2000 except as follows;

**CFFC-6(b) Filament materials:**

- (i) Carbon fibers: Must be polyacrylonitrile (PAN) based carbon fiber tows having mechanical properties meeting a specified procurement document. The mechanical properties of the fibers must be established for each procurement batch by testing in accordance with ASTM D-4018-93 and have a minimum strand strength specified in the cylinder manufacturer's material specification document. The tensile strength may not exceed 6,205,282 kPa (900,000 psi), the modulus of elasticity may not exceed 317 million kPa (46 million psi), and the strain to failure may not be less than 1 percent.

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b. TESTING - The cylinders must be reinspected and hydrostatically requalified, to 5/3 of the marked service pressure, at least once every 5 years in accordance with § 180.205, and the latest edition of CGA pamphlet C-6.2 "Guidelines for Visual Inspection and Re-qualification of Fiber Reinforced High Pressure Cylinders", except as specifically noted herein:

(1) Cylinders must be volumetrically tested by the water jacket method suitable for the determination of the cylinder expansion for a minimum test time of one minute.

(2) A maximum permanent expansion to total expansion ratio does not apply. The cylinder must be condemned if the elastic expansion exceeds the rejection elastic expansion (REE) as marked on the cylinder.

(3) Retest markings must be applied on a label securely affixed to the cylinder and overcoated with epoxy, near the original test date. Metal stamping of the composite surface is prohibited. Reheat treatment of rejected cylinders is not authorized.

(4) Cylinders with fiber damage (cuts, abrasions, etc.) that exceed Level 1 type damage as defined in CGA Pamphlet C-6.2 and meet the following depth and length criteria are considered to have Level 2 damage:

a. Depth - Damage that upon visual inspection is seen to penetrate the outer fiberglass layer but does not expose the carbon layer beneath, or that has a measured depth of greater than 0.005 inches and less than 0.045 inches for cylinders with an outside diameter greater than 7.5 inches or less than 0.035 inches for cylinders 7.5 inches or less in outside diameter;

b. Length - Damage that has a maximum allowable length of:

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Region	Direction of fiber damage	Maximum length of damage
Cylinder sidewall and domes	Transverse to fiber direction (longitudinal direction)	20% of the length of the straight sidewall section of the cylinder
Cylinder sidewall and domes	In the direction of the fiber (circumferential direction)	20% of the length of the straight sidewall section of the cylinder

(5) Cylinders with damage that meet the Level 2 criteria must be rejected. Retesters must contact the cylinder manufacturer in the event that damage is questionable based on this criteria. Repair of rejected cylinders is authorized for Level 2 type damage. Repairs must be made in accordance with CGA pamphlet C-6.2, prior to the hydrostatic pressure test. Repairs must be evaluated after the hydrostatic test.

(6) Cylinders that have direct fiber damage that penetrates through the outer fiberglass layer and into the carbon layer, or that have a measured damage depth of greater than the Level 2 maximum stated in (5)(a) above are considered to have Level 3 type damage. Cylinders that have damage with depth meeting Level 2, but length exceeding the Level 2 maximum, are considered to have Level 3 type damage. Cylinders with Level 3 type damage are not authorized to be repaired, and must be condemned.

(7) A hydrostatic retest may be repeated as provided for in § 180.205(g); only two such retests are permitted. Pressurization prior to the official hydrostatic test for the purpose of a systems check must not exceed 85% of the required test pressure.

c. OPERATIONAL CONTROLS -

(1) Cylinders manufactured under this exemption are not authorized for use fifteen (15) years after the date of manufacture.

(2) Cylinders may not be used for underwater breathing purposes.

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(3) Cylinders used in oxygen service must conform to § 173.302a(a)(5)(i)-(iv).

(4) A cylinder that has been subjected to fire may not be returned to service.

(5) Transportation of oxygen is only authorized when in accordance with § 172.102(c)(2) Special Provision A52 and § 175.85(h) and (i).

(6) Cylinders must be packaged in accordance with § 173.301(a)(9).

(7) Cylinders are authorized only for use as equipment aboard commercial and military aircraft as specifically identified to the Office of Hazardous Materials Exemptions and Approvals (OHMEA).

8. SPECIAL PROVISIONS:

- a. During the initial use of this exemption, a copy of the Inspector's report for the manufacturing described in paragraph 7.a. of this exemption shall be reported to OHMEA after the first 15 lots. Upon confirmation of all testing by OHMEA, the applicant may apply for the lower cycling test requirements (§§ 10d, 10e and 10f of CFFC) for the next revision of this exemption.
- b. In accordance with the provisions of Paragraph (b) of § 173.22a, persons may use the packaging authorized by this exemption for the transportation of the hazardous materials specified in paragraph 6, only in conformance with the terms of this exemption.
- c. A person who is not a holder of this exemption, but receives a package covered by this exemption, may reoffer it for transportation provided no modification or change is made to the package or its contents and it is offered for transportation in conformance with this exemption and the HMR.
- d. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

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- e. A current copy of this exemption must be maintained at each facility where the package is manufactured under this exemption. It must be made available to a DOT representative upon request.
  - f. Each packaging manufactured under the authority of this exemption must be either (1) marked with the name of the manufacturer and location (city and state) of the facility at which it is manufactured or (2) marked with a registration symbol designated for a specific manufacturing facility by the Office of Hazardous Materials Exemptions and Approvals for a specific manufacturing facility.
  - g. The cylinders described in this exemption are authorized only for normal transportation as an article of commerce i.e., the movement of hazardous materials packages from consignor to consignee.
9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, cargo-only aircraft, and passenger-carrying aircraft (see paragraphs 7.c.(5) and (6) for restrictions).
10. MODAL REQUIREMENTS:
- a. A current copy of this exemption must be carried aboard each cargo vessel or aircraft used to transport packages covered by this exemption.
  - b. The shipper must furnish a current copy of this exemption to the air carrier before or at the time the shipment is tendered.
11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:
- o All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
  - o Persons operating under the terms of this exemption must comply with the security plan requirement in Subpart I of Part 172 of the HMR, when applicable.

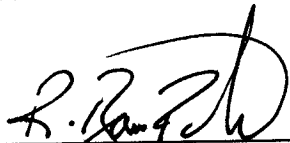
- o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when this exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: Shipments or operations conducted under this exemption are subject to the Hazardous Materials Incident Reporting requirements specified in 49 CFR §§ 171.15 - Immediate notice of certain hazardous materials incidents, and 171.16 - Detailed hazardous materials incident reports. In addition, the grantee(s) of this exemption must notify the Associate Administrator for Hazardous Materials Safety -- OHMEA, in writing, of any incident involving a package, shipment or operation conducted under terms of this exemption.

Issued in Washington, D.C.:



Robert A. McGuire  
Associate Administrator for  
Hazardous Materials Safety

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(DATE)

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Materials Safety Administration, Department of Transportation, Washington, D.C. 20590. Attention: PHH-31.

Copies of this exemption may be obtained by accessing the Hazardous Materials Safety Homepage at <http://hazmat.dot.gov/exemptions> Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

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